

REMARKS

The Examiner is respectfully requested to reconsider the rejection of claims 1 - 6, and 10 - 17 under 35 U.S.C. §103(a) as being unpatentable over Tai, et al. (U.S. Patent 6,411,745) in view of Ilbery, et al. (U.S. Patent 6,476,934).

Applicants' invention as shown for example in Figure 1 of the application shows an embodiment of the invention and shows how an image is divided into a local region of interest (ROI) and its neighborhood. The computations for a given pixel are based upon the ROI and its neighborhood. In Applicants' invention, an ROI is chosen from an input image. The region can be a window of varying dimensions. The neighborhood of the ROI includes additional image pixels from which statistical information is obtained. The image pixel values within the ROI are transformed to binary values and placed in corresponding positions in the output image according to the method described in Figures 2 and 3. The entire image is covered by tiling the ROIs so that the adjacent ROI's do not overlap.

This summary of Applicants' invention clearly defines the difference between the prior art references and the present invention. As specifically set forth in the summary above and the specification on pages 5 and 6, et al., Applicants are providing a digital image output. The input may be gray scale but the output is binary. The prior art outputs of Tai et al. and Ilbery et al. are gray scale. The prior art disclosure is diametrically opposite that of the present invention. Applicants are employing specific rules to follow to reorder their pixels.

The Examiner in his rejection has applied the disclosure of Tai, et al. to many of the elements of Applicants' invention. The Tai, et al. reference provides a "generic" type disclosure as to the method used in accordance with the disclosure. Considering the teaching that is disclosed in the Tai, et al. reference, there is no disclosure relative to the Applicants' binary output.

The differences between the Tai, et al and Ilbery, et al. patents is the processing that is performed. The processing of Tai, et al. is "a linear interpolation of the neighboring original pixels comprising the window....." Applicants' processing is never a linear interpolation of neighboring pixels. The purpose of the Tai, et al. patent is to reduce moire patterns and so interpolation is helpful. Applicants perform different processing steps to obtain a binary output. This distinguishing feature has been incorporated into Claim 1 etc.

The reference to Ilbery, et al. also processes an image pixel by pixel, and uses a neighborhood region and produces an output. In Ilbery, et al., processing a pixel depends upon results of previously processed pixels. This is a necessity for their invention because the purpose is to compensate for output errors of previously processed pixels in order to make the final result more accurate. This type of operation must be done sequentially. Applicants' invention involves using a neighborhood, but does not use the output results of previously processed pixels, so it is not a sequential operation. The details in Ilbery, et al. of what processing is performed are completely different and much of the patent explains this in detail.

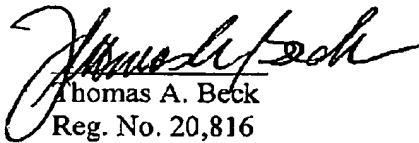
Accordingly, the nature of the processing is an important issue; not just that some processing is done and that some decisions are made. The processing as among the prior art references and Applicants' invention are totally different. The mention of "halftoning" does not warrant rendering Applicants' invention obvious. Applicants scan both half tone and text. Halftoning is only a part of their invention whereas the reproduction of a scanned halftone image is the sole focus of Tai, et al. and Ilbery, et al. Applicants' invention deals with reproduction of scanned images containing text, line art and halftoned images. Applicants' invention is not specifically designed to eliminate Moire patterns in the reproduced halftoned image as in Tai et al., or in being extremely accurate in reproducing the light and dark halftoned regions as in Ilbery et al. Applicants for example, sharpen text using their method whereas Tai, et al. in fact blur their images through interpolation.

Claims 12, 13 and 16 are "Beauregard" type claims. There is no basis for rejecting these claims as obvious over the art cited. The art makes no disclosure of the subject matter claimed in these claims.

If the Examiner wishes to discuss the substance of the claims contained herein with the intent of putting them into an allowable form, Applicants' attorney will be glad to speak with him at a mutually agreeable time by telephone and will cooperate in any way possible.

In view of the arguments contained herein, allowance of this case is warranted. Such favorable action is respectfully solicited.

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Signature:  Date: September 17, 2003
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APPENDIX

CLAIMS (with indication of status) :

Sub
D1
Claim 1. (Currently Amended) A method for transforming a digitized image, said method comprising: providing said image as a plurality of pixels, wherein data for each pixel is in a first format; and

processing said data of each of said pixels by employing data from a region of interest which includes at least one pixel following said each of said pixels, and includes a plurality of neighboring pixels,

and producing a second format for said which is a binary image, and

C1
cont
said method further comprising determining a dynamic range of pixel values of pixels in an encompassing neighborhood of the region of interest, and

wherein the step of processing includes making dynamic adjustments depending on the dynamic range of pixel values, wherein the step of making said dynamic adjustments includes producing a visually pleasing transition between text and picture areas in said image;

and wherein said producing a visually pleasing transition includes:

if said dynamic range is high, implying said pixels in said encompassing neighborhood of said region of interest are in a text area or a line art area or in an area of an image that has a high contrast edge, wherein the edges of said text area, line art area and area of an image having high contrast edge are sharpened by computing a pixel data threshold value for said region of interest;

and comparing each pixel value in said region of interest to said pixel data threshold;

if said pixel value is greater than the pixel data threshold value,
a first value is placed in the corresponding position of the said second format image;

if said pixel value is less than or equal to the pixel data threshold value,
a second value is placed in the corresponding position of the said second format image;

if said dynamic range is medium,

computing a desired number of second values to be placed in said second format image in the
region of interest;

Cont ordering the pixels in the region of interest according to the ordering of a predetermined halftone
array;

altering the order of a pixel in said ordering if said pixel has a value which is greater than the
value of the next pixel in said order by a predetermined reordering threshold value;

repeating said altering of the pixel order until the first and second values chosen for the second
format image are no longer changed;

choosing said desired number of second values for the second format from the beginning of the
said order, and assigning the remaining pixels values in the region of interest to said first value;

if said dynamic range is low,
using said predetermined halftone array to compute said first and second values for said second
format image.

Claims 2-9 canceled.

Claim 10. (Currently amended) ~~★ The method as in claim 9 where we determine a number of second value is determined, said number to be placed in said second format image based on a weighted function of the image intensity values within the region of interest of the said first format image.~~

Claim 11. (Currently amended) ~~★ The method as in claim 9 wherein the said plurality of regions-of-interest for the entire said first format.~~

C1
cont
Claim 12. (Currently amended) An article of manufacture comprising a computer usable medium having computer readable program code means embodied therein for causing a digital image to be transformed, the computer readable program code means in said article of manufacture comprising computer readable program code means for causing a computer to effect the steps of claim 1:

providing said image as a plurality of pixels, wherein data for each pixel is in a first format; and

processing said data of each of said pixels by employing data from a region of interest which includes at least one pixel following said each of said pixels, and includes a plurality of neighboring pixels.

and producing a second format which is a binary image, and

said method further comprising determining a dynamic range of pixel values of pixels in an encompassing neighborhood of the region of interest, and

wherein the step of processing includes making dynamic adjustments depending on the dynamic range of pixel values, wherein the step of making said dynamic adjustments includes producing a

visually pleasing transition between text and picture areas in said image;

and wherein said producing a visually pleasing transition includes:

if said dynamic range is high, implying said pixels in said encompassing neighborhood of said region of interest are in a text area or a line art area or in an area of an image that has a high contrast edge, wherein the edges of said text area, line art area and area of an image having high contrast edge are sharpened by computing a pixel data threshold value for said region of interest;

and comparing each pixel value in said region of interest to said pixel data threshold;

if said pixel value is greater than the pixel data threshold value,

a first value is placed in the corresponding position of the said second format image;

if said pixel value is less than or equal to the pixel data threshold value,

a second value is placed in the corresponding position of the said second format image;

if said dynamic range is medium,

computing a desired number of second values to be placed in said second format image in the region of interest;

ordering the pixels in the region of interest according to the ordering of a predetermined halftone array;

altering the order of a pixel in said ordering if said pixel has a value which is greater than the value of the next pixel in said order by a predetermined reordering threshold value;

repeating said altering of the pixel order until the first and second values chosen for the second format image are no longer changed;

choosing said desired number of second values for the second format from the beginning of the said order, and assigning the remaining pixels values in the region of interest to said first value;

if said dynamic range is low,

using said predetermined halftone array to compute said first and second values for said second format image.

13. (Currently amended) A program storage device readable by machine, tangibly embodying the program of instructions executable by the machine to perform method steps for transforming a digitized image, said method steps comprising the steps of claim 1:

providing said image as a plurality of pixels, wherein data for each pixel is in a first format; and

processing said data of each of said pixels by employing data from a region of interest which includes at least one pixel following said each of said pixels, and includes a plurality of neighboring pixels,

and producing a second format which is a binary image, and

said method further comprising determining a dynamic range of pixel values of pixels in an encompassing neighborhood of the region of interest, and

wherein the step of processing includes making dynamic adjustments depending on the dynamic range of pixel values, wherein the step of making said dynamic adjustments includes producing a visually pleasing transition between text and picture areas in said image;

and wherein said producing a visually pleasing transition includes:

if said dynamic range is high, implying said pixels in said encompassing neighborhood of said region of interest are in a text area or a line art area or in an area of an image that has a high contrast edge, wherein the edges of said text area, line art area and area of an image having high contrast edge are sharpened by computing a pixel data threshold value for said region of interest;

and comparing each pixel value in said region of interest to said pixel data threshold;

if said pixel value is greater than the pixel data threshold value,

a first value is placed in the corresponding position of the said second format image;

if said pixel value is less than or equal to the pixel data threshold value,

a second value is placed in the corresponding position of the said second format image;

if said dynamic range is medium,

computing a desired number of second values to be placed in said second format image in the region of interest;

ordering the pixels in the region of interest according to the ordering of a predetermined halftone array;

altering the order of a pixel in said ordering if said pixel has a value which is greater than the value of the next pixel in said order by a predetermined reordering threshold value;

repeating said altering of the pixel order until the first and second values chosen for the second format image are no longer changed;

choosing said desired number of second values for the second format from the beginning of the said order, and assigning the remaining pixels values in the region of interest to said first value; if said dynamic range is low.

using said predetermined halftone array to compute said first and second values for said second format image.

14. (Currently Amended) A method for processing at least a portion of an image, the method comprising employing a first rule of halftoning, ~~and a second rule of halftoning, a third rule of half toning and a fourth rule of halftoning.~~

15. (Canceled)

16. (Currently Amended) An article of manufacture comprising a computer usable medium having computer readable program means embodied therein for causing processing at least a portion of an image, the computer readable program code means in said article of manufacture comprising computer readable code means for causing a computer to effect the steps defined in claim 14.

17. (Canceled)